Graham MacDonald
Director EMEA Communications Policy
Intel Corporation
graham.macdonald@intel.com
+44 7796 190474

7th January 2018

EUROPEAN COMMISSION
Directorate-General for Communications Networks, Content and Technology
Electronic Communications Networks and Services
Radio Spectrum Policy Group
RSPG Secretariat

DG CNECT B4: Spectrum – Office: BU33 7/065

Per e-mail to CNECT RSPG (CNECT-RSPG@ec.europa.eu)

Intel Corporation Response to the RSPG17-034 public consultation on "Strategic spectrum roadmap towards 5G for Europe – 2nd Draft RSPG Opinion on 5G networks"

Dear Sir, Madam,

Intel appreciates RSPG work towards developing Europe's role in 5th generation communication systems via associated spectrum policy decisions. Intel welcomes the opportunity to provide its views on the RSPG public consultation on "Strategic spectrum roadmap towards 5G for Europe – 2nd Draft RSPG Opinion on 5G networks".

As mentioned in Intel Corporation's response, dated 31st July 2016, to European Commission "Public consultation on the Draft RSPG Opinion on spectrum related aspects for next-generation wireless systems (5G)" we believe Europe needs to take into account international 5G developments. Given expectations of a 5G launch in Europe in 2020 at the earliest, we note that some Administrations outside Europe are driving more aggressive timescales. There are various cases where access to spectrum suitable for 5G is being progressed expeditiously. In the US, the FCC on 14th July 2016 adopted new rules to enable rapid development and deployment of next generation 5G technologies and services: these new rules opened up nearly 11 GHz of high-frequency spectrum for flexible, mobile and fixed use wireless broadband – 3.85 GHz of licensed spectrum (in the 28 GHz, 37 GHz and 39 GHz bands) and 7 GHz of unlicensed spectrum (in the 64-71 GHz band)[1]. In November 2017, China's Ministry of Industry and Information Technology reserved spectrum in 3 GHz and 4 GHz for "5G" while South Korea intends to auction 3.5 GHz and 28 GHz spectrum in mid-2018.

Our response to the RSPG opinion are provided below.

Graham MacDonald
Director EMEA Communications Policy
Intel Corporation

[1] https://www.fcc.gov/document/fcc-adopts-rules-facilitate-next-generation-wireless-technologies

Intel Corporation Response to the RSPG17-034 public consultation on "Strategic spectrum roadmap towards 5G for Europe – 2nd Draft RSPG Opinion on 5G networks"

1. T**he RSPG is of the opinion** that Member States will need flexibility in the way they authorise access to spectrum, for example: appropriate geographical areas (e.g. national, regional, city or hyper-local, e.g. for use in a factory), individual licencing or under a general authorisation framework.

Generally Intel prefers exclusive nationwide or large area dedicated licenses for MNO deployments. However, we recognise that for in some Member States, smaller geographical area or use-case defined licences may be more appropriate for mmWave frequency bands.

Where exclusive dedicated licenses are not feasible there may be some circumstances where complementary ways to access spectrum could be considered (i.e. Licensed Shared Access could facilitate access to spectrum for mobile broadband).

In some mmWave frequency bands, license-exempt access under general authorization framework would be more appropriate. For example the 66-71 GHz frequency band is an ideal candidate for license-exempt use as it is immediately adjacent to the 57-66 GHz which is already widely utilized for multiple gigabit wireless systems (e.g. WiGig). For more information on 66-71 GHz, please see our response to point number 10 below.

2. **The RSPG is of the opinion** that the Commission, together with Member States, should take actions to fully support 5G related policy objectives in rural areas and wide coverage, taking into account the role of satellite in achieving ubiquitous connectivity.

Intel agrees it is important to improve rural broadband coverage and we believe that 5G utilizing various frequency ranges will significantly improve connectivity options. For example, the propagation characteristics of low frequencies enable wide area coverage including rural areas. While satellite might have a role in serving areas where terrestrial networks may not easily be able to provide affordable coverage, we have not seen any information to date showing that satellite is capable of providing the full range of 5G services.

Integrated satellite and terrestrial access networks have been discussed in the context of 3G and 4G rollout. However, these have not come to fruition thus any proposals for integrated 5G satellite solutions must be carefully evaluated. These should not place undue regulatory constraints onto mobile networks and should not delay the standardisation and implementation of mobile networks. Any role for satellite in 5G must be market-driven and complementary to those services already provided by terrestrial mobile networks.

3. **The RSPG recommends** that the Commission, in its research work-programs, study solutions for improving 5G connectivity and wide area coverage, especially in rural areas, thereby facilitating and progressing technology developments targeting the fulfilment of 5G related policy objectives.

Intel considers that the European Commission's role is more politically focussed (e.g. including means to enable 5G services in low population density rural areas where market-based competition may not work) It is important to note that access to spectrum in

low frequency bands is important to enabling wide area coverage for mobile broadband networks.

4. **The RSPG is of the opinion** that service performance and availability requirements may be relevant for some 5G cross border services to fully function and would need to be defined by the industry in a timely manner. In some cases an EU coordinated approach could be helpful in this regard to support a common European solution.

Once more information is available about potential service performance and availability needed for cross border service, an appropriate technical solution can be developed by industry.

5. **The RSPG is of the opinion** that coverage obligations can only be derived as a consequence of national policy objectives and characteristics (i.e. population distribution, geographical morphology, industrial and societal needs) and therefore cannot be harmonised on a EU-level.

Intel concurs that coverage obligations are a consequence of national policy objectives and characteristics. We further suggest that it would be inappropriate to specify onerous rollout and deployment conditions especially in mmWave bands due to small cell size as a result of propagation characteristics. An approach that encourages Operators to provide an appropriate level of coverage suitable to their business model is preferred. If Administrations / Governments desire greater geographical coverage, further mutually beneficial deployment scenarios could be investigated but not mandated.

6. **The RSPG notes** that solving issues relating to facilitating the efficient deployment of ultra-dense networks is expected to be of high importance for the rollout of 5G in dense urban areas. **The RSPG is of the opinion** that Member States should assess the need for national actions that will enable easier site authorisation and installation, in particular for small cells, in order to make timely 5G deployment possible.

Intel supports this view and other actions which may facilitate rapid deployment of 5G networks.

7. **The RSPG is of the opinion** that all commercial licences in frequency bands identified for 5G within the Member States should be subject to trading or leasing to enable new market opportunities.

Intel supports this view.

8. **The RSPG is of the opinion that** Member States should consider appropriate measures to defragment the 3.6 GHz band, the primary 5G band, in time for authorising sufficiently large blocks of spectrum by 2020.

Intel supports efforts to introduce 5G at a pan-European level as expeditiously as possible in the 3.4-3.8 GHz band which is already harmonised for mobile networks with up to 400 MHz of continuous spectrum. We agree that Member States need to plan specific actions to address current spectrum fragmentation. The ways of achieving this are expected to vary from one country to another and might include the following:

- facilitating progressive migration from paired to unpaired assignments, including allowing and encouraging existing license holders to swap their licenses;
- defining appropriate auction rules so that wide blocks of contiguous spectrum (e.g.100 MHz) are awarded;

- defining plans to relocate incumbents (e.g. FS/FSS) to other frequency bands: (sharing solutions could also be considered in the short term to avoid delays in the auctioning process

9. **The RSPG is of the opinion that** in relation to the 26 GHz pioneer band (24.25 - 27.5 GHz):

   - the focus of 5G authorisations in the 26 GHz band should be on an individual licence regime. However, the possibility of a general authorisation regime under sharing conditions that protect the other users of spectrum in this band (e.g. EESS/SRS) is not excluded.

As mentioned in our response to Q1 Intel generally prefers exclusive dedicated nationwide or large area licenses but we recognise that for mmWave frequency bands smaller area licences may be more appropriate. We not supportive of General Authorisation Regime for 26 GHz band.

   - the Commission should include as part of any technical harmonisation for the 26 GHz band, in high level terms, the requirements to maintain the possibility for continued development of incumbent satellite services (FSS and EESS/SRS). Future earth stations should be authorised based on transparent, objective and proportionate criteria to safeguard their future operations and ensuring that they are unlikely to have a significant impact on 5G deployment and coverage. Member States will remain fully responsible for granting or rejecting authorisation to a new satellite earth station application.

Intel believes that there are multiple options ranging from having future earth stations use frequency bands other than 26 GHz whenever or limiting earth station locations to areas where they can be deployed without limiting 5G deployment.

With respect to EESS/SRS operation below 24.25 GHz, 5G out-of-band limits should not be so stringent that they impede 5G operation: overly stringent limits could make the 26 GHz band useless for 5G operation.

   - Member States should make by 2020 a sufficiently large portion of the band, e.g. 1 GHz, available for 5G in response to market demand, taking into account that 5G deployment in this frequency range is expected to be used for local coverage.

Intel supports this view but notes that most countries are considering making at least 1 GHz of mmWave spectrum available per operator for initial rollouts. Europe Administrations should ensure the whole 26 GHz band is made available for 5G use before WRC-19. In countries where the lower part of the band 24.25-27.5 GHz is heavily used e.g. for FS deployments, the upper part 26.5-27.5 GHz as a minimum should be licensed in a first phase in 2018. As initial 5G deployments worldwide are occurring within 26.5-29.5 GHz, the selection of the uppermost 1 GHz will further provide harmonization and enable benefits from the economies of scale.

   - Regulatory flexibility for the progressive release of the 26 GHz band will facilitate an efficient introduction of 5G without having an unnecessary negative impact on the current users of the band. Member States should plan any migration of fixed links necessary for ensuring the availability of the band for 5G, taking into account the geographical dimension of the market demand for 5G.

Intel supports this view.

10. **The RSPG is of the opinion** that general authorised frequency use can be an important breeding ground for innovation and contributes towards a dynamic market environment. The application of a general authorisation regime is foreseen in the 66-71 GHz band which could be an important band for 5G.

Intel believes that both 3GPP-based and IEEE 802.11 based technologies will play an important role in supporting 5G services and applications. Intel supports making the 66-71 GHz band available for licence exempt use but we do **not** believe an IMT identification for this band is necessary to facilitate 5G licence-exempt deployments.

Our preference is **not** to seek an "IMT" identification for this band. The 66-71 GHz band is adjacent to the 57-66 GHz band which is already being made available in many countries for licence-exempt use by multi gigabit applications. We are concerned that if 66-71 GHz is designated for IMT that other technologies currently accessing the 57-66 GHz band today could be deliberately precluded from accessing the 66-71 GHz band. Furthermore, licence-exempt use of the 66-71 GHz band by multi-gigabit applications can be implemented in a similar way as for the 57-66 GHz band under the existing allocation to the Mobile Service in the ITU Radio Regulations. These technologies are further detailed in Recommendation ITU-R M.2003 "Multiple Gigabit Wireless Systems in frequencies around 60 GHz".

Graham MacDonald
Director EMEA Communications Policy
Intel Corporation